Chapter 7
Where Is the Missing Matter?
A Comment on "The Essence" of Additive Manufacturing

Tihomir Mitev
Plovdiv University "Paisii Hilendarski", Bulgaria

ABSTRACT

The additive manufacturing (or the popular 3D printing) is relatively new technology which opens new spaces for entrepreneurial imagination and promises next stage of the industrial revolution. It is creating three dimensional solid objects from a digital file. The printer transforms the file into a material object layer by layer, using different raw materials. Today, the additive manufacturing is successfully used in architecture, medicine and healthcare, light and heavy industries, education, etc. The paper analyses the roles of actors in manufacturing the objects. It starts with the Heideggerian questioning of technology (Heidegger 1977), searching for the causes of bringing into appearance of the 3D model. According to Heideggerian analysis the technology is represented as an 'unveiling of the truth'. The paper suggests that the old understanding of matter as a thing-in-itself should be replaced by a new, flexible, fluid, concept of matter, which is more or less manipulable. The matter is no more an occasion for object's taking place. On the other hand, it seems 3D printing technology is reduced to mere means; a simple intermediary, a copier of ideas. From that perspective the paper questioning the problem of action in ANT and search how action and interaction is distributed and how actors constitutes themselves as well as their actor-world.

1. INTRODUCTION: WHAT IS ADDITIVE MANUFACTURING?

The precursors of the additive technology could be found in the XIX-the century, when the researchers have been searching for different ways of three-dimensional copying of solid objects. Yet, the additive manufacturing (or as it is more popular three-dimensional printing), as a substantive technology, is relatively new technology that has been developed radically with the promoting of the computer-aided design (CAD), computer numerical control (CNC) machining, and lasers. It really opens new spaces for

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entrepreneurial imagination and promises a next stage of the industrial revolution. (Koleva, A. 2015) This is a technology known to the world for over 30 years. What is it; how does it work?

The 3D printing is based on the development of digital technologies.

Additive manufacturing (AM), also referred to as solid freeform fabrication (SFF) or three dimensional (3D) printing, is a set of layer-by-layer processes for producing 3D objects directly from a digital model. (Weber, C. L., Peña, V., and al. 2013: 1)

The additive technology is an encounter and confluence of numerous of fields like photonics, computer science and modelling, materials science, control theory and computer numerically controlled machining, and machine design. It is a creating of three dimensional solid objects from a digital file, and the printer transforms the file into a material object, using different raw materials. A range of different fibres of metals, plastics and composite materials may be used. Among the most commonly used materials in three-dimensional printing are acrylonitile butadiene styrene (ABS), polylactic acid (PLA), steel, titanium, gold, silver, as well as nylon, nylon, glass-filled polyamide, epoxy resins, wax, and photopolymers; even bio-material. Instead of carving or milling of detail from an existing solid object, the additive manufacturing fabricates the product, using materials that have been transformed in fine powder. Since there is no removing of material and the object is built "bottom-up", that technology is acknowledged as a completely opposite to the classical ones.

The stages of production process in 3D printing are performed in three steps - designing (usually with CAD software), printing (structuring of the material layers) and finishing (polishing and colouring). They are mainly three specific methods/techniques of manufacturing: Selective laser sintering (SLS); Fused deposition modeling (FDM); Stereolithography (SLA).

The additive manufacturing is considered to be one of the fastest growing markets today. Since its active development in 1980-s till 2013 it has grown to above $ 3 billion (Wohlers 2013). It is applied both to the designing of prototypes and to the regular production of small product series. It was initially applied for industrial purposes, then gradually it was being commercialized, and today some promotes the role of 3D printing in everyday life. There are lots of advantages of that technology: local production, reduced consumption of resources, rapid prototyping, development and adjustment of patterns, rapid production of tools and spare parts, freedom of design and personalized production. Today, the additive manufacturing is successfully used in architecture, medicine and healthcare, light and heavy industries, education, culture industries, etc.

It seems that it is a revolutionary technology with vast scope and great promises. Is there something brand new with that technology? How the production process has been challenged? How the interaction between men and nature in the fabricating of artefacts take place? These issues will be discussed below from the perspective of philosophy of Martin Heidegger.

2. THE ADDITIVE MANUFACTURING: THE CHALLENGING OF THE "STOCK"?

Reflections on the nature and the role of technology are old enough. They start with two initial assumptions that pretend to outline exhaustively the essence of technology. As Heidegger resumes, according to the "old" philosophical doctrine, technology is: 1) means for the achieving of goals and 2) a certain kind of human activity. These two viewpoints could be defined as instrumental and anthropological